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EXAMINER	
ANGEBRANNDT, M	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 17

Application Number: 08/970066
Filing Date: 11/13/97
Appellant(s): Dhal et al.

David J. Cole
For Appellant

EXAMINER'S ANSWER

This is in response to appellant's brief on appeal filed 6/4/99.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement that there are no related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is correct.

(7) Grouping of Claims

Appellant's brief includes a statement that all of the claims stand or fall together on page 13 of the Brief.

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

The following is a listing of the prior art of record relied upon in the rejection of claims under appeal.

97/13183	Dhal et al.	04/1997	(PCT document)
4,950,567	Keys et al.	08/1990	
5,698,345	Ohe et al.	12/1997	(03/1995)
5,702,846	Sato et al.	12/1997	(09/1995)
0391162	Eckberg et al.	10/1990	(EP document)

Crivello et al., J. Polymer. Sci., Vol 28A, pp. 479-503 (1990)

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A) Claims 1-4 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhal et al. WO/97/13183, in view of Ohe et al. '345 and Keys et al. '567.

Dhal et al. WO/97/13183 teaches the use of compositions including at least one monomer or oligomer capable of undergoing cationic photopolymerization. The use of any monomer capable of undergoing cationic polymerization is disclosed on pages 6 and 7. Useful photosensitizers and photointitiators are disclosed on pages 5 and 7. Useful binders are disclosed on page 4.

Ohe et al. '345 teaches the use of cationically polymerizable materials which result in improved diffraction efficiency and superior environmental properties. Useful epoxides include those disclosed in columns 12-15.

Keys et al. '567 teaches that when more crosslinking is desired, the use of multi functional monomers in amounts up to 5% is a means to achieves this.

It would have been obvious to one skilled in the art to add other, multi functional epoxy monomers/oligomers, such as those disclosed by Ohe et al. '345, to the composition of Dhal et al. WO/97/13183 and use them in forming a hologram based upon the direction to use more than one and that any cationically polymerizable compound(s) would be useful in the composition within the Dhal et al. WO/97/13183 reference, their previous use within the holographic art by Ohe et al. '345 and the direction to the addition of polyfunctional monomers when increased crosslinking is desired in the holographic art by Keys et al. '567.

The applicant argues that the combination of the references does not show the benefit discovered by the applicants, in that minimal shrinkage occurs when difunctional and polyfunctional monomers are used. The applicant agrees that using tri or higher functional monomers will rigidify the resulting polymeric structure and that this is well known in polymer technology. The applicant argues that this teaching has nothing to do with the benefits achieved by or problems solved by the applicants. The examiner disagrees, noting that increased crosslinking and the resultant increase in rigidity due to it would be expected to reduce shrinkage as *the more rigid structure would be more resistant to forces acting upon it.* This would be

appreciated for polyfunctional monomers irrespective of the mechanism by which the crosslinking occurs. The increased rigidity and reduced shrinkage due to that rigidity would be expected with increased crosslinking for both cationic and free radical polymerization systems. Direction to use increased crosslinking within the art is shown by Keys et al. '567 and as similar enhancement processes are used, would be expected to achieve similar benefits. Additionally, increased refractive index modulation and resistance to abrasion and/or swelling (causing drift of replay wavelength) could reasonably be expected by one skilled in the art. The rejection is maintained.

B) Claims 1-4 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhal et al. WO/97/13183, in view of Ohe et al. '345, Keys et al. '567 and Sato et al. '846

Sato et al. '846 teaches useful cationic polymerizable compounds (3/5-4/4) The use of compounds having a siloxane group increases, refractive index modulation. This includes compounds embraced by formula (I).

In addition to the basis provided above, the examiner holds that it would have been obvious to use other siloxane compounds known to be useful cationically polymerizable materials, such as those disclosed by Sato et al. '846, in place of those specifically used in the examples of Dhal et al. WO/97/13183 as modified by Ohe et al. '345 and Keys et al. '567 with a reasonable expectation of achieving comparable results and that any cationically polymerizable compound(s) would be useful in the composition within the Dhal et al. WO/97/13183 reference.

No further response is presented as no further arguments are forwarded by the applicant.

C) Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhal et al. WO/97/13183, in view of Ohe et al. '345, Keys et al. '567 and Crivello et al. J. Polymer Sci. and/or Eckberg et al. EP 0391162.

Crivello et al. J. Polymer Sci.,Vol. 28A pp. 479-503 teaches the use of various epoxy silane compounds including those shown in tables I and II. Useful properties appear in pp 501-503

Eckberg et al. EP 0391162 teaches the use of cationically curable compounds embraced by the formula shown in the abstract and on page 5 with cationic photoinitiators.

In addition to the basis provided above, the examiner holds that it would have been obvious to use other siloxane compounds known to be useful cationically polymerizable materials, such as those disclosed by Crivello et al. J. Polymer Sci. and/or Eckberg et al. EP 0391162, in place of those specifically used in the examples of Dhal et al. WO/97/13183 as modified by Ohe et al. '345 and Keys et al. '567 with a reasonable expectation of achieving comparable results and that any cationically polymerizable compound(s) would be useful in the composition within the Dhal et al. WO/97/13183 reference.

No further response is presented as no further arguments are forwarded by the applicant.

(11) Response to Argument

The applicant argues, with citation of several pieces of case law, that the combination of references may only be made if there is motivation to do so. The examiner points to the fact that Dhal et al. WO/97/13183, Ohe et al. '345 and Keys et al. '567 are all analogous and that Dhal et al. WO/97/13183 specifically states that "Any monomer capable of rapid cationic polymerization may be used in the present medium....a wide variety of such monomers are known to those skilled in the polymer art." and "Preferred monomers .. are those containing at least one epoxide .. ." on page 6 at lines 21+. The examiner believes that this directs one to other references within the art which teach cationically polymerizable monomers suitable for use in holographic recording media. The examiner holds that Ohe et al. '345 is one such reference and that it teaches a wide range of monomers embraced by the cited language of Dhal et al. WO/97/13183. The examiner further notes that within the holography art it is known to be desirable to have increased crosslinking as discussed by Keys et al. '567. The examiner holds that one skilled in the art would recognize that with any polyfunctional monomer, increased crosslinking relative to monofunctional monomers would be expected irrespective of the mechanism of the polymerization being free radical or cationic based. The examiner points out that the Keys et al. reference makes specific reference to increased crosslinking (6/17-45) indicating it's importance within the art. If this was not important to holographic recording in photopolymerizable media, then the reference would merely be to a collection of monomers.

The applicant further adds beginning on page 15 that the combination of the references do not show the addition of the polyfunctional monomers as resulting in a medium which

undergoes minimal shrinkage. The examiner points to the advisory action pointing out that a comparison of the actual (not modeled) shrinkage rates could obviate the rejections based upon Dhal et al.. The examiner points to the *instant specification on page 10 at lines 18-21 which states that "this shrinkage desirably does not exceed about 1 per cent"* and **to example 6 of the Dhal et al. reference, which is described as a "reflection hologram produced with very little shrinkage of the holographic medium" (page 12/lines 6-7) and where "the ratio of lambda maximum at 509.9 nm to the imaging wavelength was 0.991, which indicates that the amount of shrinkage occurring during hologram formation was lass than 1 percent.(page 12,lines 19-21)** It would seem that with a shrinkage of less than 1 percent already of record, that the benefit relied upon by the applicant might not amount to much.

The applicant admits that the use of tri or higher functional monomers to rigidify the resulting polymer is well known in the polymer art as the board is no doubt aware. (page 16/lines 18-20), but argues that does not point to reduced shrinkage. As noted above, evidence of any benefit over Dhal et al. has not been made of record and the examiner points out that increased crosslinking is clearly desirable within the holographic art irrespective of the specific reasons based upon the prominence accorded it by Keys et al. The applicant argues that even though tri or higher functional free radical monomers result in increased crosslinking, there is no evidence that this happens with cationically polymerizable monomers. The examiner holds this is clearly misleading as irrespective of the type of polymerization the

monomers react together to form chains and as tri and higher monomers have more reactive sites that could be accommodated by a linear reaction (ie a string of the monomer along a single axis such as difunctional monomers might form) it is clear that these additional reactive sites will react with other adjacent reactive sites to crosslink and bind adjacent polymer chains together. The applicant argues that there would be no reason to have a more rigid polymer as a support is provided. The examiner notes this and that these do not necessarily have covers for the other side of the hologram. The examiner notes that motivation for increased crosslinking is clearly shown in Keys et al. '567, who also notes that protective layer may be applied, and therefore infers that holograms are sometimes subject to mechanical abrasion and the like (col. 10/lines 2-9.

With respect to the applicant's arguments concerning the jump from mechanical rigidity to decreased shrinkage, the examiner agrees with the applicant. **The examiner also points out that example 6 of the Dhal et al. reference evidenced less than 1% shrinkage and that this is within the preferred range disclosed in the instant specification on page 10 at lines 19-21.** The examiner has shown that one is directed by Dhal et al. to other monomers known within the art, including the polyfunctional monomers of Ohe et al. and specifically to crosslinking monomers as this is known in the art to be useful. The applicant has failed to present evidence which measures the shrinkage of the hologram for the Dhal et al. materials a well as those embraced by the claims, noting that the instant specification and the Dhal et al.

reference include inventors in common and that assumably they have access to the material of both references and time to do so.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Martin J. Angebranndt
Primary Examiner, Group 1750
August 10, 1999

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